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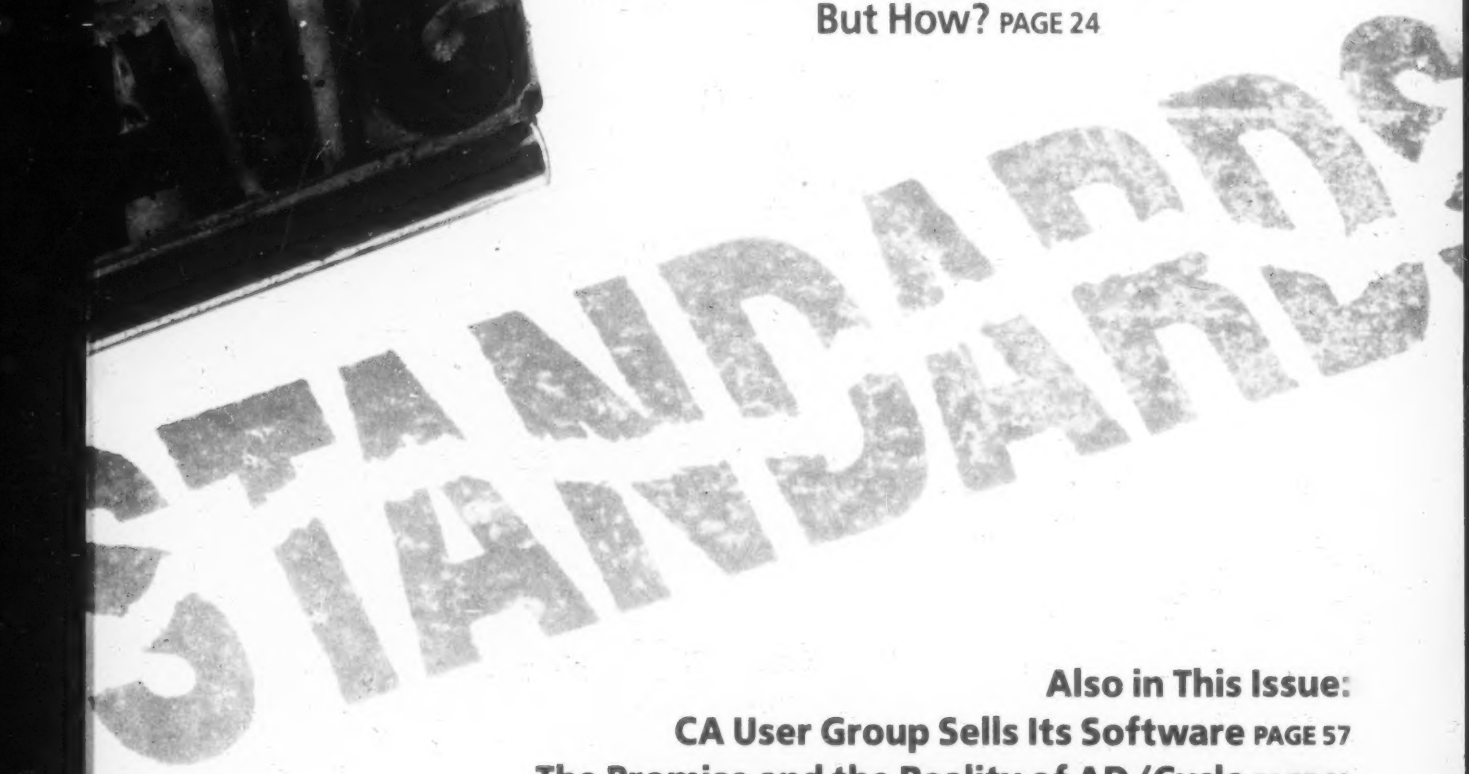
SPECIAL REPORT: Ashton-Tate Gets Back to dBASEics PAGE 38

DATAMATION

FOR MANAGERS OF INFORMATION TECHNOLOGY WORLDWIDE

THE STANDARDS PROCESS BREAKS DOWN

What Was a Clear Process Has Become Confused and Chaotic. What's Needed Is an Overhaul. But How? PAGE 24



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Outsourcing: Who Pulls the Strings? PAGE 103

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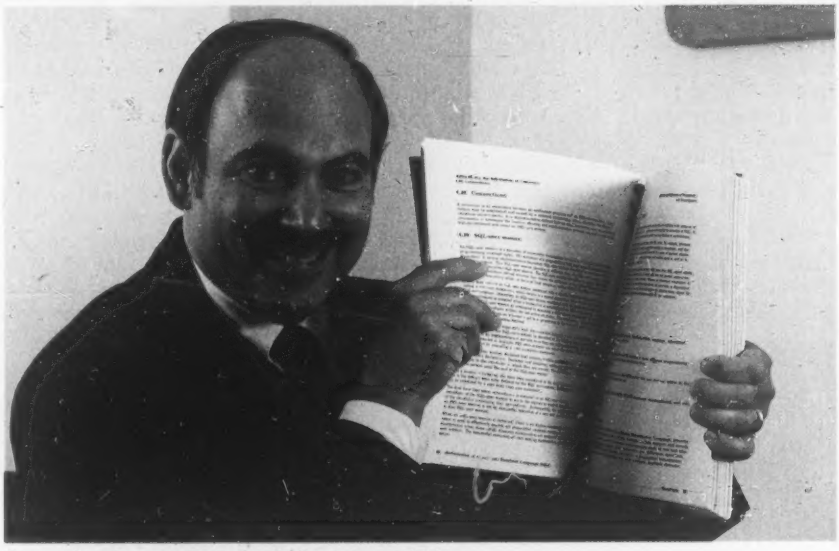
COVER STORY



Stamp out the standards confusion in your lifetime.

The Standards Process Breaks Down 24

BY JEFF MOAD X3, the primary U.S. body for computer industry standards, has become overwhelmed and inefficient. Is X3 giving way to more effective standards bodies or is the standards-making process itself getting out of control?

Cover photography by David Bradley

SPECIAL REPORT

Ashton-Tate Gets Back to dBASEics 38

BY JOHN McMULLEN After struggling for nearly two years to deliver a better dBASE IV, Ashton-Tate hopes that the worst of its problems are over. But even if the new version 1.1 performs as advertised, the company faces ongoing threats to its leadership position.

INSIGHTS ON DISTRIBUTED COMPUTING

The more you get into workstations, the more you get into interactive applications and the [need for] shared results between people on a network—and the bigger the problems you get if you don't have a well-defined set of software interface standards.

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British Petroleum
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Where the rubber hits the road with UNIX is its ability to handle networking.

Mark C. Kustoff
Rhône-Poulenc Rorer Inc.
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We have four elements that we will network together. Our goal is on-line sharing of images and information among all our productions and publications.

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Christian Science Publishing Society
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FOR MANAGERS OF INFORMATION TECHNOLOGY WORLDWIDE

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Setting Standards in the '90s

As surely as personal computers distinguished the '80s, minicomputers the '70s and mainframes the '60s, so too will the '90s be marked by a recognizable advance in information technology. Less certain is whether progress in this decade will be identified with a technology or with something else—something, perhaps, having much greater impact than any combination of chips, software and networks could achieve.

That something could well be standards. The term—although applied most often in reference to operating systems, communications, interfaces and the like—really embraces much more than components of information technology. Whether they take the form of UNIX, OSI or GUIs, standards mean freedom for users. Standards, when they exist, allow users to choose the building blocks of their applications with confidence that those blocks will fit with the others in their applications—now and in the future.

PUTTING BACK THE PIECES of standards confusion.

Trouble is, the formal standards process—at least in the United States—isn't working very well. The problem, as senior writer Jeff Moad finds in "The Standards Process Breaks Down," p. 24, is fairly simple to see: the committees that promulgate standards aren't market driven. Users, the people who ultimately foot the bill for standards, don't have much say in the process. And time, the factor against which most suppliers and users really compete, doesn't seem to be a big concern for most formal standards-setting bodies.

Too much is at stake, of course, for the process to stay this way. Suppliers and users alike are forming consortia of all kinds to create new standards—quickly. The Corporation for Open Systems, the Open Software Foundation and X/Open Co. Ltd., some of the better known groups, are already having an influence on products coming to market. Less visible, but perhaps of greater importance, are the groups of industry-specific users and software developers that have banded together to speed agreement on technologies crucial to their business success.

Striking Oil With Standards

DATAMATION Dallas bureau manager Bob Francis, who a year ago chronicled the efforts of Detroit's big auto makers and a dozen other *Fortune* 500 industrial companies to forge a standard for the exchange of product data, has found another user-driven standards endeavor that is closer to home. In "Oil Firms Seek UNIX Standards," p. 63, Francis reveals why the world's leading oil producers expect to strike it rich if they can adopt a standard for using workstations in their exploration applications.

Such users must be a larger factor in standards-setting efforts, but the fact is that suppliers will continue to wield significant influence. Their strength is no more evident than in relational database technology. Even a supplier that has lost its luster, as associate editor John McMullen finds in "Ashton-Tate Gets Back to dBASEics," still holds power over users that have invested millions in creating applications atop its RDMS.

Tim Mead

Tim Mead, Editor-in-Chief

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What's Cookin' in Campbell's CIM Lab

Forget field testing—lab testing is faster and safer. Campbell Soup Co.'s IS lab-tested *everything* before installing its new computer-integrated manufacturing system in the field. The first failure: IBM's OS/2EE.

BY CHRIS SIVULA

Nobody would argue with Campbell Soup Co.'s 10-year plan to use information systems to cut costs, reduce inventory and improve quality. "It's all motherhood and apple pie," says Alan Carr, director of manufacturing systems.

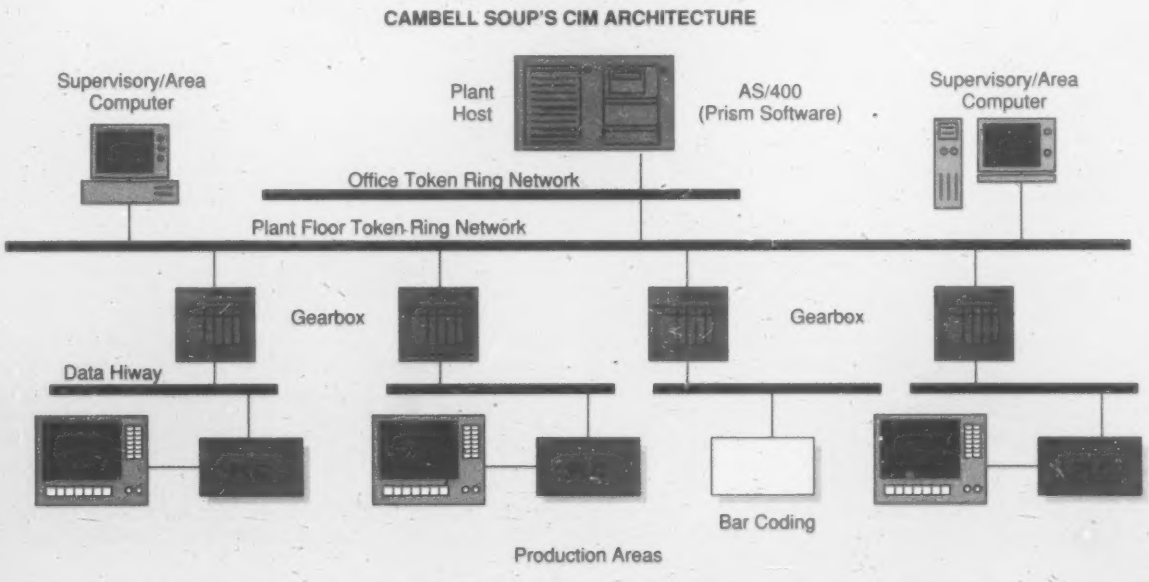
But getting agreement from the Camden, N.J.-based company's 39 worldwide IS departments about how to reach those goals is another matter altogether. Four years into a major overhaul and centralization of its computer-integrated manufacturing (CIM) process, Campbell has come to depend more and more on its corporate IS test lab to help build support in the field for the new factory automation project and to accelerate the installation process for a centralized CIM management system. By aggressively using the test lab, Campbell's IS management hopes to finish the project within the next two years—four years ahead of the original plan.

The project is ambitious. The CIM group at Campbell's information systems department is working to develop an integrated system that will link higher level financial management applications at corporate headquarters to the factory-level financial systems (including purchasing, receiving, inventories, bill payment and payroll processing) at all 39 plant sites. It will also link financial systems to the systems that control the automation process on the factory floor.

Campbell, established in 1869, generated $5.7 billion in sales last year with 55,000 employees worldwide. Besides the familiar red-and-white canned soup, the company makes Prego spaghetti sauce, Vlasic pickles, Mrs. Paul's fish sticks and Pepperidge Farm breads. Bringing together the production and financial management systems for such di-

What's Cooking in Campbell's CIM Test Lab?

IS set up this working model of a typical Campbell Soup plant's CIM systems and software at the company's Camden, N.J., headquarters.



verse and widely scattered operations into an integrated system is no easy task.

All nine of Campbell's U.S. plants have brought up CIM factory automation systems. But the central financial management system planned for Campbell's corporate headquarters has stalled.

To smooth the transition to a fully automated, corporatewide CIM/financial management system, Campbell's CIM project managers are using a model factory at the company's headquarters in Camden to serve as a test lab for the new systems. The CIM lab houses a duplicate version of the standardized system that the plants are adopting and is the locus for changes in IS and CIM systems at all Campbell Soup plants. It includes a network of 10 PS/2s and an IBM AS/400 midrange computer to duplicate the on-site plant systems and processes down to the level of the logic controllers on the plant floor, says Michael Cola, Campbell's project manager for CIM.

Bug-Free Soup Kitchens

For the most part, developers at the lab use software to simulate factory conditions. But occasionally they modify the test system to duplicate actual production processes. Cola brought in automated scales to measure ingredients for Campbell's products during one test project, for example. And the group isn't afraid to use creative substitution, either; recently, the CIM lab's IS staff rigged up a turntable device to pass cans under a sensor during development of a product-counting system.

Corporate IS at Campbell recently launched a formal effort to speed development of new applications, and the CIM lab is a key part of that effort. Virtually all new software and in-house redesigns of existing systems are tested first in the lab in order to avoid the nightmare of bringing up new and untried systems on site at operating plants. Testing new systems in the lab first also helps decrease time to market, since simulations of new production processes can stamp out most bugs before they show up in the soup kitchens at Campbell's plant sites.

Automation: Not Soup Yet

Systems management staff at Campbell Soup Co. entered uncharted territory when they set about automating all of the company's plant sites around the world, then tying these sites directly to Campbell's corporate headquarters. It's never been done before, and they had no models to follow.

In fact, the process industry still has a long way to go to automate production. Discrete manufacturing—electronics, autos, aircraft and the like—has generally taken the lead in automating production. Process manufacturing—prepared foods, pharmaceuticals and chemicals—has had problems translating the analog world of mixing and melding into the digital world of automated-manufacturing technology. And in both types of manufacturing, integrating the management of several plant sites into corporate headquarters stretches the boundaries of traditional IS functions.

To help develop systems that push past those boundaries, Campbell has joined a consortium that includes IBM, SmithKline & French Laboratories International, Nestle Food Corp., Johnson & Johnson and Ralston Purina Co. The consortium's project, called Process Operations Management System (POMS), is designed to provide code needed to seamlessly link the factory floor with corporate management.

In 1988, the consortium launched the Industrial Computing Designs Corp., or INCODE, of Reston, Va., specifically to develop an operating version of POMS. Under the consortium's agreement, INCODE owns the software, and IBM maintains marketing rights. In exchange for their participation, the five process manufacturers receive an enterprisewide license to use the software.

Last summer, Campbell's IS management was high on the project. Because the software is designed for the PS/2 and AS/400 systems—both already installed in nine of Campbell's plants—the food manufacturer expected a quick roll-out once POMS was shipped. But POMS was delayed for six months, and then Campbell's test lab discovered a bug in OS/2EE version 1.2, the operating system required for its implementation of POMS. As a result, the company has backed off from its plan for a quick test and fast implementation. But despite the late release and subsequent problems with OS/2, INCODE pushed ahead and released a developers' version of POMS early this year written to work with the older version of OS/2; INCODE subsequently released a final version of POMS in June.

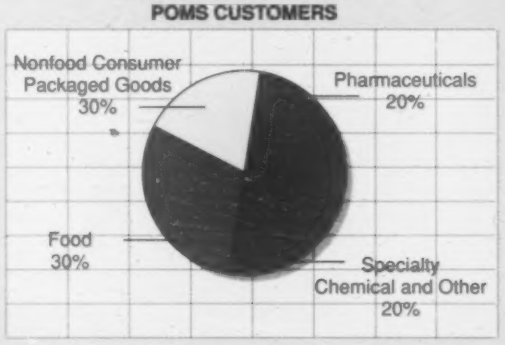
The developers' version of POMS wasn't of much use to Campbell, says Michael T. Moylett, system analyst for the CIM group in Camden. Developers there could use it to design some screen displays but not to build the integrated applications—production schedules, formulas, inventory tracking, product counts and downtime analyses—that require networking capabilities not available on the early release, Moylett says.

So, now there is no set schedule for POMS implementation at Campbell. The software is still being extensively tested at the CIM lab in Camden, and there is some question as to whether it will ever be installed in the field. MIS management is now considering alternative solutions to the problem of centralized CIM management, Moylett says. Even if the extensive testing reveals no more bugs and Moylett can solve some apparent incompatibilities between Campbell's management systems and POMS, the CIM group in Camden is still not sure that IS management at Campbell's production plants will accept POMS.

Adds Moylett: "If people don't agree to run it, then it doesn't matter if it's the best stuff in the world."

Needed Badly: A Process Operations Management System

For 50,000 process industries worldwide, CIM is still science fiction. Can POMS make it real? Campbell's Soup has its doubts.



Total POMS market: 50,000 installations
U.S. share: 17,000 installations
Source: Advanced Manufacturing Research

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But the lab is likely to play one of its most important roles at Campbell by helping to convince plant managers and regional IS executives to become more willing participants in the company's plans to integrate and standardize CIM applications, Cola says. The lab's contribution in those areas is simple, but crucial. An already skeptical plant manager, responsible for maintaining production schedules, won't be won over by a new application that crashes and brings manufacturing to a halt. But by using lab tests to refine installation procedures and clear away bugs in advance, Cola hopes to convince the skeptics that the downtime required to bring up new systems will be minimal.

OS/2 Fails the Test

When IBM shipped OS/2 Extended Edition version 1.2 to Campbell in June, the lab proved it could prevent that sort of disaster with the installation of OS/2. Just one week before the new version of OS/2 was scheduled for installation at the company's Sacramento, Calif., plant, Cola gave it a test run at the lab. The results: "It basically clobbered the network management software," he says.

□ OS/2EE BASICALLY CLOBBERED THE NETWORK MANAGEMENT SOFTWARE.

The off-the-shelf version of OS/2 that IBM shipped contained a bug most users might never have noticed. But Campbell's system pushed OS/2 further than IBM's tests had. "IBM hadn't stretched the envelope as far as we did," explains Michael T. Moylett, system analyst for the CIM group at Campbell. Cola had to postpone further tests for two weeks to wait for a fix from IBM. That's the kind of experience that makes him shudder at the thought of taking untested software directly out to a manufacturing plant, he says.

By testing first and asking questions later, Campbell's IS management has successfully avoided many of the potential problems associated with the installation of new systems. At each of the company's nine U.S. plants, an IBM AS/400 serves as the host computer and a Token Ring network links a series of PS/2s running OS/2 Extended Edition to the host. Prism, a production resource planning package from Marcam Corp. of Newton, Mass., resides on the AS/400. The manufacturing control software is ONSPEC, from Heuristics Inc. of Sacramento. In addition to all nine of Campbell's U.S.-based food-processing plants, which have switched over to a standardized CIM system in the last four years, Campbell owns 30 offshore plants that are still in the process of converting.

The next step for the U.S. plant sites is to tie into a centralized integrated management system at Campbell's Camden headquarters, says Moylett. In an attempt to do so, Campbell has entered into a partnership with four other process-manufacturing firms, IBM and the Industrial Computing Designs Corp. (INCODE) in Reston, Va., to develop a centralized process industry management system called POMS (for Process Operations Management System). However, Campbell's management is taking a go-slow attitude towards POMS and doesn't expect to have a system installed for at least another two years, says Moylett, if that. They plan to test the system further at the CIM lab and build stronger support among plant site IS staff, as well.

IS staffers at the off-shore plants fear the new centralized system could mean reduced autonomy for regional and departmental IS personnel. The trick for Campbell, says Rob Cohen, director of development services for corporate MIS, is to create the disciplined approach to centralization that will allow integration of the various plant systems but still leave on-site IS officials the measure of independence they need to develop creative solutions to problems unique to individual plants.

Support from the regional IS staff isn't the only problem: the new centralized integrated system also requires that plant engineers work much more closely with IS than they have in the past. Such a marriage is not without its problems. One way that Campbell is trying to make the union between IS and engineering reasonably smooth, if not blissful, is by hiring Carr, an engineer, away from the R&D shop to manage the CIM project. In the U.S. plants, at least, that seems to have been a good move. Carr says: "There was some confrontation for a while, but we've managed to build a consensus." ▭

CIM Links IS and Engineering

If you're having problems getting support in the field for bringing up a companywide computer-integrated manufacturing system, be sure you've got strong support from the top—then crow about it. "Having champions at high levels is critical," says Rob Cohen, Campbell Soup Co.'s director of MIS development services.

CAMBELL SOUP'S COHEN (L), AND CARR: It's all motherhood and apple pie, Carr says.

With top management in their corner, IS and engineering at Campbell were able to develop a formal structure to settle the political problems that inevitably develop when the lines between departmental turfs begin to blur, Cohen says.

For starters, when IS execs decided to create a CIM position four years ago, they found their final candidate right in the engineering department: Alan Carr. Carr was recruited from engineering's research and development division, where he was working on plant control systems.

"The feeling was that MIS had little experience in engineering and plant floor systems," says Carr. By picking Carr, IS not only picked up engineering expertise, it also obtained a direct link to the engineering department.

Carr reinforces the link by talking almost daily with his counterparts in engineering. Other formal ties between the two departments include regular meetings between engineering, operations and IS to hammer out technical details and periodic, although less frequent, meetings between the vice presidents of IS and engineering to develop joint policy statements regarding the company's move to CIM.

A More Open Market For Supercomputers

Recent trade negotiations with the United States may already be influencing Japanese users and creating a more open, competitive Japanese supercomputer market, particularly in the public sector.

BY KRIS HERBST

Since the U.S.-Japanese trade negotiations were concluded this spring with the Super 301 pact, there has been near universal assent that the agreement has resolved U.S. complaints about trade barriers blocking access to the Japanese supercomputer market.

Indeed, increased business inquiries from the public sector are an indication that the agreement seems to have alleviated the main point of contention: lack of access by U.S. companies to the business of the Japanese government and universities.

Yoshikazu Hori, president of Cray Research Japan Ltd., says the trade agreement has abolished the market barriers, giving Cray, for one, equal access to the Japanese supercomputer market. "I appreciate very much what has been done from both sides—the U.S. government and the Japanese government," he says. "The situation has been improved; out of those tough negotiations, I think Cray's market share will grow."

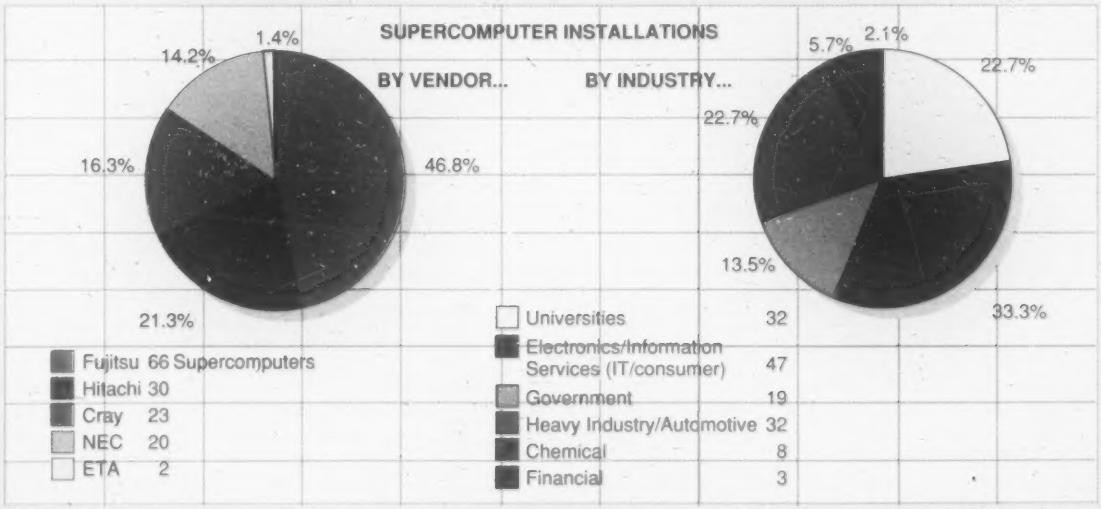
Now that the formal barriers have been negotiated away, U.S. supercomputer makers can concentrate on battling other, less obvious market barriers. One is the impressions, held by many chief executives in Japan, that Japanese technology is superior to U.S. technology and that Japanese companies are less likely to discontinue product lines or go out of business, says Cray's Hori. "The market is growing and we have a lot of opportunity, but competition is always so intense," he says.

Everyone Gets a Piece of the Action

That competition is unlikely to let up. Manufacturers on both sides of the Pacific predict that growth in the Japanese supercomputer market will allow everyone to get a piece of the action. Supercomputer sales in Japan totaled 30 units in 1989 and will grow at a rate of slightly more than 15% annually, reaching 64

The Shape of Japan's Super World

Unofficial figures compiled by a U.S. government agency show Fujitsu with nearly half of the approximately 141 supercomputers installed in Japan to date. The electronics industry, both computer and consumer, leads in the use of supercomputers with one third, followed by heavy industry/automotive with 22.7%.



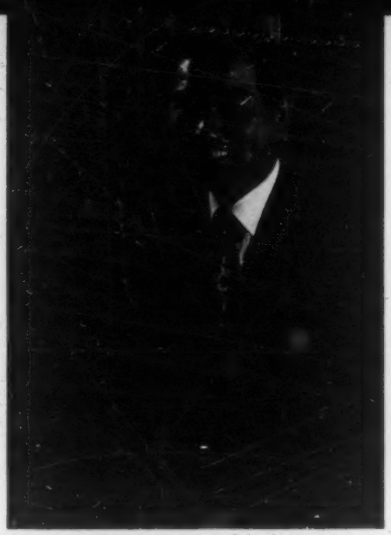
Source: U.S. Government

units in 1994, according to Junichi Saeki, research manager for the information systems group of Dataquest Japan Ltd. in Tokyo.

"The market is really booming," confirms Raul Mendez, director of Recruit Co. Ltd.'s Institute for Supercomputing Research, also in Tokyo, which uses both Japanese and U.S. supercomputers. The institute has two Crays—an X-MP/216 and X-MP/18—as well as a Fujitsu VP400 and an NEC SX-2A.

Mendez points out that 65% of the supercomputers in Japan have been purchased by users in private industry, in contrast to the situation in the United States, where the majority of the supercomputers are installed in government agencies, universities and academic research institutes. "The industrial sector is one of the biggest users of supercomputers in Japan, bigger than the defense sector or universities, and Japanese industry and the economy is booming," Mendez says.

Figures vary as to the actual number of supercomputers installed in Japan. But no matter who does the counting, Fujitsu Ltd. dominates the total Japanese supercomputer market. Dataquest Japan puts Fujitsu's total at 56 supercomputer installations, giving it a little more than a 51% share of the market. Unofficial figures from the U.S. government put the total at 66. Either way, "Fujitsu is very strong in marketing," Mendez says. "They hold the largest share of large-scale computer systems, including mainframes. As a consequence of tha[t large market share], they provide very good support, and that gets tra[nslated] to a large share of the supercomputer market." The Dataquest figures show both Cray Research Japan and Hitachi Ltd. with 18 installations, or about 17% of the market each, followed by NEC Corp., which has 16 installations, giving it a 15% share. The U.S. figures put Cray in second place with 23 computers representing a 16% share. NEC, with 20, accounts for about 14% of the market (see chart, "The Shape of Japan's Super World").



CRAY'S HORI: Cray's prospects for selling to the public sector have improved along with its batting average.

Cray itself offers figures for market share by type of machine, saying that it commands a 53% share of the market for high-end supercomputers. Until now, it has not attempted to compete in the Japanese market for low-end machines, or minisupercomputers, although it is now preparing to introduce a low-priced air-cooled supercomputer.

The public market for supercomputers is only half the size of the private market in Japan. But it is an important one for Cray because "the public sector market is always requiring top-end machines; it's a big market for the big machines," Hori says. He adds that other benefits from public sector sales include joint development of new software applications with universities and the creation of a pool of engineers who become loyal to a particular machine in college and can influence their employers' purchasing decisions when they move into the private sector.

Until now, neither Cray nor any other U.S. supercomputer firm has had much success in penetrating the public market. The U.S. Embassy in Japan says that U.S. firms hold less than 6% of the public sector supercomputer market, which includes Japan's universities.

But when it comes to private industry, particularly Japan's automakers, Cray has an advantage over its competitors. The Japanese supercomputer industry lags years behind the United States in developing software applications and operating systems, so Japanese manufacturers must rely on U.S. supercomputers such as Crays to accelerate their design cycle times and keep them competitive.

□ U.S. FIRMS HOLD LESS THAN 6% OF THE PUBLIC SECTOR SUPERCOMPUTER MARKET.

Cray Fishing

A Cray supercomputer can be found at Daihatsu Motor Co. Ltd., at Honda Motor Co. Ltd., at Mazda Motor Corp. and at Mitsubishi Motors Corp. Nissan Motor Co. Ltd. and Toyota Motor Corp. each have two. Hori adds that he has focused mainly on the automotive industry since he was hired by Cray in 1987. Analyst Mendez says, "I see a lot of demand within the automobile industry. Practically all automakers in Japan are using Cray supercomputers because they have very good software applications for crash analysis and various other simulations."

The lack of software is hindering Japanese supercomputer makers from marketing their wares outside Japan, according to Mendez. "The lead that Cray has in that area is quite significant," he says. "It's going to be a while before that gap can be overtaken."

In an attempt to close the software gap, Japanese supercomputer manufacturers are setting up software-porting centers in Japan and the United States. "NEC is now making very strong efforts to port application packages by using our software porting center here in Tokyo and the sys-

Japanese Architecture's Prime Example

NEC Corp.'s latest supercomputer, the SX-3 series (known as the SX-X in the United States), is the ultimate expression of Japan's multiple pipeline approach to supercomputer architecture.

The series sets a new standard for multiple pipeline architecture, using eight add pipelines and eight multiply pipes that function independently, serving 16 vector-function units in each of up to four processors. This is about double the number of pipes used in the current generation of Japanese supercomputers. Shipments of the SX-3 series were scheduled to begin in August or September, says Tadashi Watanabe, assistant general manager of NEC's EDP product-planning division.

The architecture will make the top-of-the-line machine in NEC's SX-3 series, by far, the world's fastest supercomputer, with a peak performance rate of 22 billion floating point operations per second (GFLOPS), according to NEC. Japanese multipipeline supercomputers like the SX-3 allow fast peak operating speeds when used for certain types of computational problems that are characterized by long vector lengths, on the order of 2,000 to 3,000 words, and a high ratio of vector to scalar computations. Examples of these kinds of computations include certain fluid dynamics problems and geographical model simulations such as seismic exploration or weather forecasting.

tems we have installed at the Houston Area Research Center (HARC)," says Tadashi Watanabe, assistant general manager of NEC's EDP product-planning division.

UNIX: the Next Generation

Japan's Big Three supercomputer vendors, Fujitsu, Hitachi and NEC, have all announced plans to include the UNIX operating system with their next generation of supercomputers, which should improve software portability. These computers will also incorporate the Transmission Control Protocol/Internet Protocol (TCP/IP) networking standard, which should advance connectivity among disparate systems.

In supercomputer hardware, Japan is posing a vigorous challenge to U.S. technology. Since the first-generation Japanese supercomputers appeared in 1983, Japanese manufacturers have used a CPU architecture that relies on multiple pipelines in a single processor to maximize peak operating speeds. In contrast, Cray computers have incorporated multiple processors and have consistently used only one addition pipeline and one multiplication pipeline per CPU.

☐ PRACTICALLY ALL AUTOMAKERS IN JAPAN ARE USING CRAY SUPERCOMPUTERS.

The multiple pipeline approach has allowed Japanese supercomputer makers to achieve fast peak performance on benchmark tests characterized by long vector lengths. For intermediate vector length problems, however, the overhead time that multipipeline machines require to move data back and forth from the memory can drastically reduce actual sustained performance speeds. Because of this limitation, the current generation of Japanese supercomputers has been matched or exceeded by the Cray Y-MP8 in other benchmark tests.

Some industry observers maintain that the practical limits of multiple pipeline architecture will be reached with NEC's newest SX-3 series, which is scheduled for an August or September release. At this point, they say, adding more pipelines could yield diminishing returns in boosting operating speeds.

It now appears that the U.S. and Japanese approaches are converging, says Mendez. The SX-3 series marks the first time a Japanese supercomputer manufacturer has used multiple processors in a single supercomputer. At the same time, Cray is expected to use more pipelines in its future models.

Cray is pitting its architecture against NEC's in an attempt to win one of four public contracts that were up for bid this year. The two are vying to provide a multiple-processor supercomputer for the Computational Fluid Dynamics Center at Japan's Tohoku University. Looking for proof that U.S. vendors now have real access to the public sector, both the U.S. government and the U.S. supercomputer industry have been closely monitoring the course of these public-sector contracts.

Cray's Batting Average Improves

Because the university already uses NEC computers, it appeared initially that NEC had the inside track on the Tohoku contract. But a rumor persists that NEC will quietly withdraw from the bidding at the last moment, allowing Cray to win the contract by default. Two explanations exist for the rumor. One is that the withdrawal will be a response to behind-the-scenes pressure from the Japanese government, which is hoping a Cray sale to Tohoku will reduce trade frictions with the United States. Alternatively, NEC may withdraw because of delays in preparing the SX-3 for release because the Japanese firm can't meet Tohoku's technical specifications.

NEC has avoided comment on the Tohoku contract, although Watanabe says, "We are now carefully watching their specifications. Whether our system will meet them or not, I can't say at the present time."

Cray's Hori expects to win just one of the four public supercomputer contracts—at Tohoku. Two of the contracts—for the Japan Atomic Energy Research Institute and the National Aerospace Laboratory—have already been awarded to Fujitsu; and Hori says, "I gave up bidding on the Kyoto University contract because Kyoto is entirely a Fujitsu shop." Nevertheless, Hori says, he is satisfied to be batting .250 this year. "At least we have a 25% market share in the public sector," he says, smiling. "In the past, it was almost zero. For the last three years it [the whole market] has been a Fujitsu environment."

And today's reasonably better batting average may be tomorrow's stellar World Series performance. As Hori points out, "We have had quite a few inquiries from the Japan Science and Technology Agency and the Ministry of Education [which is in charge of purchasing supercomputers for Japan's universities], totaling more than $100 million. I don't know if they have been budgeted or not, but such a strong demand for the Cray is very encouraging for us." ▭

Kris Herbst is a Tokyo-based freelance writer specializing in technology topics.

Solving the "Super" Trade Problem

Before the most recent round of U.S.-Japanese trade negotiations commenced, the United States complained repeatedly that Japanese procurement practices prevented U.S. firms from selling supercomputers to public sector buyers.

Notwithstanding the fact that Japanese supercomputer vendors often find the U.S. public sector less than open, the U.S. claim was largely true. In the past, Japanese computer makers have sold supercomputers to Japan's government institutions at enormous discounts, often 80%to 90%. U.S. vendors could not match these discounts, which were virtually locked in by the government's practice of determining its budget for supercomputer purchases based on what it had paid for its previous, heavily discounted machines.

The United States also complained that the mechanics of the government's procurement process were obscure, that selections were made on the basis of a supercomputer's unrealistic theoretical peak, or catalog, performance, rather than on actual sustained performance. Once those minimum specifications were met, supercomputers were picked on the basis of price, rather than on a combination of price plus performance, which weighed heavily against U.S. supercomputers.

The new Super 301 agreement between the United States and Japan should eliminate discounts in the Japanese public sector by providing adequate government funding (although some discounting will still occur in the commercial market). The pact also makes the procurement process more clear to potential vendors, institutes a complaint procedure and requires that a combination of actual performance and price be used as the criterion for awarding procurement contracts.

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